Effectiveness of a Qigong program on sleep quality among community-dwelling older adults with mild to moderate depression

A randomized controlled trial

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Abstract

Purpose – The purpose of this study was to determine the effectiveness of a Qigong program on older adults in the Thai community suffering from mild to moderate depression.

Design/methodology/approach – A randomized controlled trial study was conducted in a public health service (PHS) center setting. Sixty-six older adults aged 60–90 years with mild to moderate depressive symptoms measured by the Thai Geriatric Depression Scale (TGDS: scores 13–24) were recruited and randomly allocated into two groups. The subjective sleep quality was assessed using the Thai version of the Pittsburgh Sleep Quality Index (TPSQI). The Qigong program group was given 12 weeks of Qigong training including three sessions per week, while the control group followed normal PHS activities (singing and praying). The outcome measure was the change in the TGDS from baseline to 12 weeks.

Findings – Participants in the Qigong program group had a significantly improved TPSQI global score ($p < 0.001$), subjective sleep quality ($p < 0.001$), and sleep latency ($p < 0.05$) after 12 weeks of intervention, while those in the control group showed no significant difference in sleep quality. Compared with the control group, the Qigong program group reported significantly better sleep quality throughout the 12-week period. The prevalence of poor sleep quality in this population was 82 percent.

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Originality/value – This study confirmed that the Qigong program could improve sleep quality in older adults with mild to moderate depressive symptoms as the Qigong program conferred more significant improvements than the usual program.

Keywords Qigong, Sleep quality, Depression, Older adult

Paper type Research paper

Introduction

Worldwide, people are affected by sleep deprivation and sleep disorders [1]. Sleep problems are a vital factor associated with short- and long-term effects on overall health, especially among older adults [2, 3]. The prevalence of sleep problems is normally at 36 percent [4] and rises to 50 percent among the older adult population [5, 6]. In the United States, epidemiological studies reported that practically 50 percent of the older population had some aspects of sleep problems and the figure for the elderly was reported at 60 percent in Thailand [7, 8]. Poor sleep quality accelerates negative results with a higher prevalence of medical conditions such as chronic diseases, physical disabilities, and other comorbidities, especially mental illnesses [9]. The severity of these problems impacts public health resources but also adds to a country's economic losses. Alternative treatments and prevention education remain scarce.

The East Asian and the Pacific regions have more number of older people than any other area in the world [10]. In Thailand's rapidly aging population, the country's estimated age has increased by 6.8 percent in 1994 to 9.4 percent in 2002 and 12.2 percent in 2012 [11]. The relationship between sleep problems and psychiatric conditions such as depression, hypochondriasis, mania, and psychosis are common clinical observations [12]. Many reports revealed an association between sleep quality and depression and further indicated that poor quality sleep was associated with worsening symptoms [13, 14]. For the global disease burden, depression ranks first among psychiatric disorders, ranks third among all disorders, and is set to move up the ranks to first place by 2030 [15]. In 2008, the epidemiology of the Mental Disorders National Survey found major depressive disorders (MDDs) in the Thai population was at 3.2 percent [16], while in the past six years, the prevalence of depression among Thai older adults living in Bangkok, Thailand, was 12.78 percent [17], of which 8.23 percent had only depressive symptomatology (male 5.43 percent, female 9.63 percent) [18]. Community-dwelling older adults, the older people who live within the community and not in an institutional setting, especially those who have yet to display any symptoms of severe mental disorder or physical illness, usually refuse to go to the hospital or public healthcare facilities and reject any help from health professionals. This elderly group was always difficult to approach, making it difficult to identify any illnesses at an early stage, especially an MDD, a common mental health disorder in later life and a major public health problem because of its devastating effect on the community. Gaining access to and the trust of this hidden depressive elderly population required specific planning [19]. The depression criteria among Thai older adults as judged by the Thai Geriatric Depression Scale (TGDS) are as follows: an average person (0–12 points), mild depression (13–18 points), moderate depression (19–24 points), and severe depression (25–30 points) [20]. In the United States, almost one-third of older adults suffer from underdiagnosed and undertreated depression [21]. In-depth studies about older adults with mild to moderate depression who live in a community-dwelling setting are still lacking [18], and since sleep problems among older adults can lead to several health problems, proper prevention is necessary.

Qigong is an ancient Chinese exercise routine that includes physical activities, breathing practices, and meditation. Physical activities can be seen as a preventive method, and practicing the movements can improve multiple health problems. The meditation aspect plays a vital role in brain functions, inducing intrinsic neural plasticity development and modulating endocrine, metabolic, autonomic, and immune functions, and thus mediates global regulatory changes in different behavioral states, including sleep. Breathing practices are not only used to promote

mental relaxation but can also powerfully influence higher order brain function especially when utilizing the diaphragmatic breathing practice. This can help lower cortisol levels which relates to depression and sleep problems [22, 23]. Previous studies have demonstrated that Qigong not only helps reduce depressive symptoms but also improves mental functioning in older people with chronic diseases [24]. In addition, several aerobic exercise studies have reported positive effects on sleep quality in people with chronic insomnia [25].

Other studies showed strong evidence to support the positive association between increased levels of physical activity, exercise participation, and improved health in relation to older adults [26]. Nevertheless, participation in physical activities remains low among older adults, especially at the community level, and encouragement to increase their physical activity is needed [27]. There are almost no adverse effects reported in the literature [28, 29], and its evidence-based channels in improving health-related quality of life for older adults show that it is a socially acceptable method of intervention or a form of group exercise [30]. Furthermore, evidence of some randomized controlled trials suggests that Qigong is effective in improving sleep quality and readily available at only a small cost to a substantial proportion of the population. While general health condition–related studies are available, more specific research into the benefits of Qigong for this growing percentage of the population is still limited and would be beneficial [31–34].

This present study was carried out to assess the potential effects of Qigong practice on sleep quality in Thai older adults who showed signs of depression and its effect on life expectancy. Healthy aging can reduce care resource utilization, resulting in better sleep quality, a lower risk of depression, and a higher quality of life for older adults, ultimately lowering healthcare costs.

Materials and methods

Study design and ethics approval

This experimental study was conducted in two districts; the sites were located at the public health service (PHS) centre in each randomized district in Bangkok, Thailand, from October to December 2017. The study was a parallel, randomized controlled trial that was designed to compare the Qigong program practice against a standard Thai elderly program (singing and praying) among older adults with mild to moderate risk of depression.

Ethical consideration

The study was approved by the Institutional Review Board of the Faculty of Medicine, Chulalongkorn University (IRB No. 381/59) and adhered to the tenets of the Declaration of Helsinki. The study was registered with the Thai clinical trial registration database (No. TCTR20180627004).

Inclusion/exclusion criteria

Healthy volunteers aged 60 – 90 years, with scores on the TGDS between 13 and 24, showing no suicide risk evaluated by the Mini International Neuropsychiatric Interview Part C (M.I.N.I.-Suicidality) and no cognitive impairment as evaluated by the Thai Mental State Examination (TMSE) were recruited and randomly assigned by cooperative PHS centers into the intervention and control group. The intervention group was given a 12-week Qigong program to follow, while the control group participated in singing and praying activities with the same duration and frequency. The study population consisted of older adults without any personal case history or presence of a major depressive disorder, bipolar affective disorders, schizophrenia, cognitive impairment, and severe illnesses (cardiac, hepatic, or renal failure; cancer; or other systemic diseases). Volunteers who were currently taking any antidepressants were also excluded. All volunteers had not previously practiced Qigong or a similar exercise such as tai chi for at least six months before the study.

Recruitment and randomization procedures

The participants were recruited through announcements made in the community in the Bang Na District and Khlong Toei District of Bangkok. Randomization was performed by a statistician using a computerized randomization method. The districts were randomly assigned by clinical research coordinators to either the Qigong group or the control group. The randomized allocation process included different areas of Bangkok for the two groups, the PHS No. 8 Bangna District and the PHS No. 41 Khlong Toei District, with participants unable to preselect which group they would be assigned to.

Intervention

The Qigong program used in this study was developed by experts with more than 30 years of experience in Qigong practice. The Qigong practice focused on accurate movement together with rhythmic breathing and meditation practice. Each Qigong class lasted 60 minutes and consisted of a warm-up (15 minutes), posture and breathing (10 minutes), main Qigong treatment (25 minutes), and a cooldown (10 minutes) session. However, in this study, the warm-up and cooldown exercise times were emphasized to focus on stabilization of the autonomic nervous system activity.

All intervention group participants who were recruited to the Qigong group attended a Qigong class provided by two expert Qigong instructors three times a week for 12 weeks at PHS No. 41; meanwhile, the control group received standard activities such as praying and singing, in the same time period and frequency as the Qigong group, led by a coresearcher based at PHS No. 8. Participants in the control group were also instructed to maintain their normal activities outside of the PHS (singing and praying) during the study period, but at the end of the research period, this group was given a DVD and booklet about the Qigong program, and both groups were recommended to perform Qigong at home at least three times a week.

Assessment

The Thai version of the Pittsburgh Sleep Quality Index (TPSQI) inquiry form measured several different aspects of sleep. The questionnaire consisted of 19 individual items, seven sleep component scores, each with a range of 0–3 points that produced one global score (sensitivity of 77.78 percent and specificity of 93.33 percent) [35]. In this study, participants were asked to respond by completing all questions about how they felt over a one-month time period. This applied to healthy participants and those with medical conditions and mild to moderately cognitively impaired older adults [18], who were all assessed at baseline and then again at 12 weeks.

Sample size and data analysis

Sample size estimation based on detecting progression to depression using the Geriatric Depression Scale (GDS) was performed by assuming that the mean of change in the GDS was 20 percent and mean (standard deviation [SD]) of GDS progression was 6.15 (1.46) [36], with an alpha error of 5 percent and a statistical power of 80 percent. Therefore, the sample size was 46. Allowing for a possible 10 percent dropout, the sample size needed to be 25 in each group, with a total of 50 participants. Change in the TPSQI at the end of the 12-week treatment period was the endpoint in this study. The comparison was between the participants who were assigned to the Qigong group and the control group.

TPSQI data were analyzed using the intention-to-treat (ITT) principle. The chi-squared test was used to determine the differences in a categorized independent variable between Qigong and control groups. Group differences in baseline characteristics were tested using the independent *t*-test for continuous variables. The independent *t*-test was used to compare the difference between the two groups, and the paired t-test was used to compare the difference in the TPSQI score before and after treatment within each group. When the

assumption of normality was violated, the Wilcoxon rank-sum test and Wilcoxon signed-rank test were used. Statistical analysis was performed using STATA, and the level of significance was established at a p-value of less than 0.05.

Results

Demographic data

A total of 274 participants were screened for eligibility, and eventually, 66 were included in this trial. Of those that were not included, 47 withdrew consent, four participants moved to other provinces, one participant moved abroad, and another 156 participants did not meet the inclusion criteria. The eligible participants were randomly assigned to the Qigong group ($n = 33$) or the control group ($n = 33$), and data for all these participants were analyzed.

Participants in both the Qigong group and the control group had no dropouts. The subjects were recruited between June 15, 2017, and September 24, 2017, and the trial ended on December 22, 2017 (Figure 1).

Baseline characteristics of the participants

From June 2017 through September 2017, a total of 274 participants were screened for eligibility; 66 qualified and underwent randomization, with 33 subjects allocated to each group and participated in all sessions. Table I indicates the baseline characteristics of the study population. The two groups were clearly identified with regards to baseline characteristics such as age, sex, income, marital status, educational level, self-reported health status, the proportion of diabetes, hypertension, dyslipidemia treatment, and knee pain (Table I).

Adherence to intervention

All 66 participants completed their allocated aims and provided complete data on the outcome measures at 12 weeks. At baseline, there were no significant differences in demographic variables or main outcomes between the Qigong group and the control group. An aggregate of 66 participants (100 percent) attended 29 or more sessions (an 80 percent attendance rate). Attendance did not differ significantly among the groups ($P = 0.87$).

Outcomes

Regarding the scoring guidelines, there were 19 items of the TPSQI used to generate seven sleep component scores (each range of possible subscale scores was 0–3) including subjective sleep quality, sleep latency (i.e., time required to fall asleep), sleep duration (number of hours of actual sleep per night), habitual sleep efficiency (i.e., total sleep time divided by time spent in bed, and converted to a score of 0–3), sleep disturbances (waking up during the night and so on), use of sleeping medications, and daytime dysfunction (e.g., feeling sleepy or having difficulty staying awake during the day). The sum of the component scores yielded a global score (range, 0–21), with a score cutoff of greater than five indicating clinical sleep impairment in identifying insomnia [37]. Table II shows the change of a global score among the Qigong group and the control group before and after the end of the practice phase of the intervention (i.e., 12 weeks after learning about the Qigong program and completing the 36 sessions or at least 80 percent of the full set). Among the participants who had good sleep quality at the beginning of the Qigong program, the baseline TPSQI scores were unchanged and remained static in both groups until the end of the program. While in the control group, eight participants who started out in the good-sleep group moved to the poor-sleep group after the-12 week program concluded.

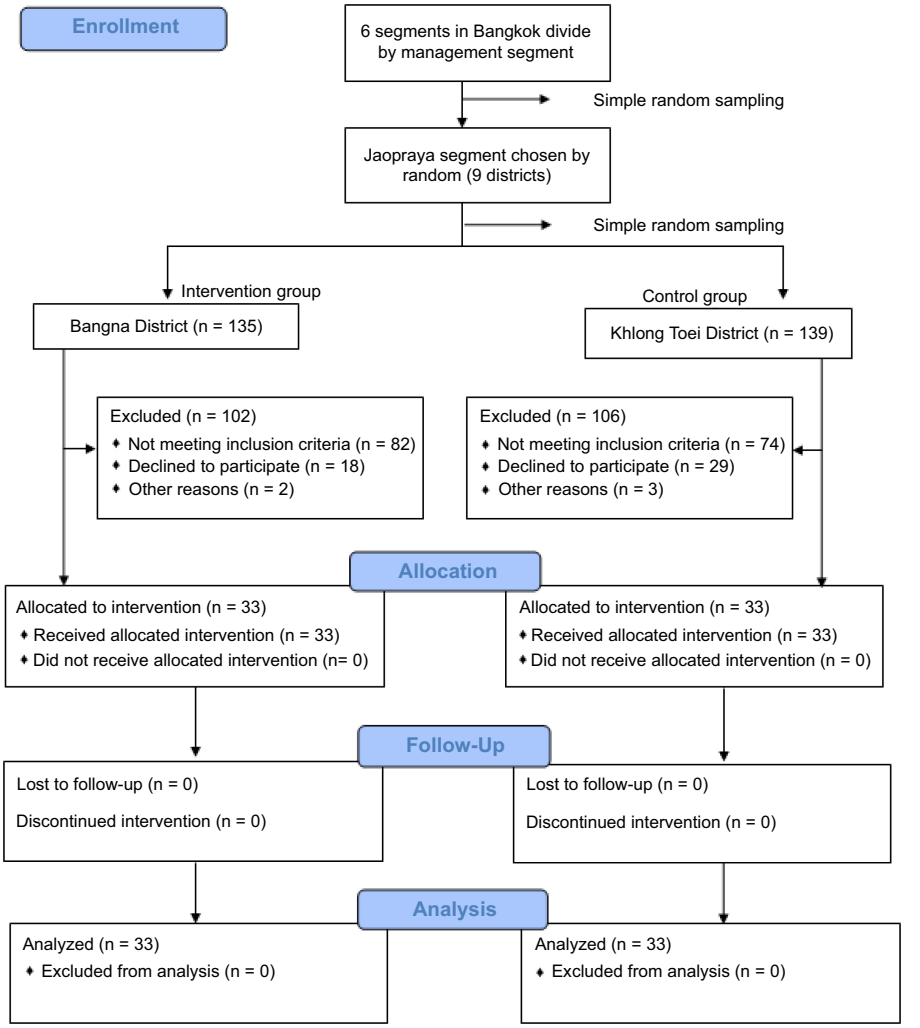

Figure 1.
Flowchart of this study

The mean (±SD) differences in TPSQI global scores within a group and among two groups at 12 weeks are shown in Table III. The participants in the Qigong group accomplished significantly better than those following the usual activities (praying and singing). The Qigong group had better TPSQI global scores than the control group in the 36-session program, with a between-group difference of 4.33 score points (95% confidence interval [CI], −6.83 to −1.83; $P < 0.001$).

From baseline to 12 weeks, the participants in the Qigong group had a mean decrease of 5.18 score points (95% CI, −6.85 to −3.51; $P < 0.001$). Participants in the control group also had a mean decrease of 0.85 score points with no significant score change in the TPSQI (Table III).

In Table IV, the outcome measures show a change in the TPSQI global score and the seven-component scores of the TPSQI over the 12 weeks. Among the participants with poor

sleep quality, improvements were found in the Qigong group relative to the control group. These results remain unchanged when analyses covered for TGDS scores at baseline.

Discussion

The study findings show that participation in the Qigong program relates to improvements in self-rated sleep quality among older adults with mild to moderate depression symptoms. When compared to the control group, a greater proportion of participants in the Qigong program achieved a treatment threshold as defined by a TPSQI score of less than five, which was evident 12 weeks after the completion of each program. Improvements in self-reported sleep were consistently found in two of the seven components of the TPSQI, including sleep quality and sleep latency. No change was found for measures of sleep efficiency, sleep duration, sleep disturbance, and daytime disturbance or sleeping medications throughout the research period.

	Qigong group (n = 33)	Control group (n = 33)
Gender (male/female)	9/24	9/24
Age (years) mean (SD)	69 (6.3)	71 (6.9)
Range (min-max)	(61–87)	(60–82)
Income median (Q1, Q3)	3,000 (1,000, 5,000)	2,700 (700, 5,000)
Marital status: Single/married/divorced	0/22/11	3/18/12
Educational level: Illiterate/educated	4/29	3/30
Self-reported health status: Poor/fair/good or excellent	10/16/7	6/18/9
Diabetes (%)	14 (42.4)	20 (60.6)
Hypertension (%)	14 (42.4)	18 (54.5)
Dyslipidemia (%)	17 (51.5)	11 (33.3)
Knee pain (%)	5 (15.2)	2 (6.1)

Table I. Demographic and clinical characteristics of the study participants at baseline

	12 weeks					
	Qigong group			Control group		
Sleep quality	Good sleep	Poor sleep	Total	Good sleep	Poor sleep	Total
Baseline good sleep	10	1	11	9	8	17
Poor sleep	12	10	22	5	11	16
Total	22	11	33	14	19	33

Note: Using chi-squared test, $p = 0.0023$ for the Qigong group and $p = 0.4054$ for the control group

Table II. Comparison of the change of sleep quality among the Qigong group and control group at baseline and after 12 weeks

	Mean (SD) (after − before)	Difference within group (95% CI)	Difference between group (95% CI)
Qigong group (n = 33)			
Baseline	10.00 (5.14)	−5.18 (−6.85, −3.51)**	−4.33 (−6.83, −1.83)**
12 weeks	4.82 (2.30)		
Control group (n = 33)			
Baseline	7.79 (4.22)	−0.85 (−2.77, 1.08)	
12 weeks	6.94 (3.59)		

Note: $^{**}P < 0.001$

Table III. Mean estimates derived from comparing differences between Qigong and control groups in terms of TPSQI changes from baseline to 12 weeks within a group and between groups

Variables (range: 0–3)	Group (n = 33)	Mean difference (SD) (after – before)	Between-group difference (95% CI)
Subjective sleep quality	Qigong	−0.36 (0.74)	−0.67 (−1.02, −0.32)**
	Control	0.30 (0.68)	–
Sleep latency	Qigong	−0.64 (0.99)	−0.79 (−1.30, −0.27)*
	Control	0.15 (1.09)	–
Sleep duration	Qigong	−0.18 (1.51)	−0.36 (−1.05, 0.33)
	Control	0.18 (1.29)	–
Habitual sleep efficiency	Qigong	−0.24 (0.66)	−0.12 (−0.57, 0.33)
	Control	−0.12 (1.11)	–
Sleep disturbance	Qigong	−0.27 (0.83)	−0.24 (−0.62, 0.13)
	Control	−0.03 (0.68)	–
Use of sleeping medication	Qigong	−0.21 (0.86)	−0.24 (−0.91, 0.42)
	Control	0.03 (1.70)	–
Daytime dysfunction	Qigong	−0.42 (1.06)	−0.52 (−0.02, 1.02)
	Control	0.09 (1.10)	–

Notes: *P < 0.05; **P < 0.001

Table IV.
Mean difference of TPSQI components related to preintervention and postintervention for each group and between-group change score analysis

Exercise can contribute to improved sleep quality. A meta-analysis indicated that regular exercise had a positive outcome on sleep quality [38]. The results of this study relating to the effect of the Qigong program on sleep quality among older adults are in accordance with those by Chan *et al.* [39] regarding the effect of the Qigong program on the improvement of night-time sleep quality among older adults with cognitive impairments. The results of the study by Rogers *et al.* [40] also indicated that Qigong practice might result in improved physical function and counteracted depression and anxiety, improved social relations, and was considered to be a positive factor for the total score of sleep quality in the elderly. Tsang *et al.* [36, 41] reported that after 8 weeks of Qigong practice, improvements in mood, self-efficacy, and personal well-being were observed. Further studies by Tsang also suggested the hypotheses that the antidepressive effect of Qigong exercise could be explained by amelioration disruptions in psychosocial functioning and potential downregulation of hyperactivity of the hypothalamic–pituitary–adrenal axis.

Qigong stimulates the production of endorphins, reinforces the feeling of power during the day, and improves sleep quality during the night. People who perform Qigong mostly declare that they have higher levels of energy and improved equilibrium with fewer mood swings or changes. However, this study has some limitations. First, the findings must be interpreted with caution as they may not be generalizable to the healthy older adult population. Thus, the efficacy and effectiveness of Qigong on sleep quality in older adults with different physical problems should be further tested in future studies.

Moreover, future studies should plan for other exercises or activities in the control group. Second, the study was limited in the gender balance caused by the predominance of females

attending community centers. A future study should recruit an equal number of males and females so that sex differences in the intervention effects can be evaluated. However, this study has several strengths, including randomization procedures, sample size, and proper adherence to the intervention.

In conclusion, with its relatively low cost, small space requirements, no specialized equipment requirement combined with the safety of the practice itself, Qigong could be a very useful choice to help in the prevention of the onset of mild to moderate depression in older adults. The results of this study show that there is evidence that Qigong practice is a realistic alternative intervention program to help improve sleep quality among older adults with a risk of depression who are living in the community and not in a hospital or nursing home setting. Early detection and assessment of sleep problems with a sleep quality screening test are essential. An increase in public education to show the link between sleep quality and old age needs to be emphasized.

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